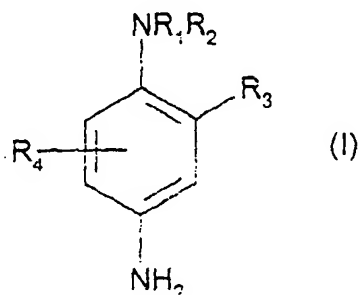


WHAT IS CLAIMED IS:

1. A composition for the oxidation dyeing of keratin fibers, comprising, in a medium suitable for dyeing:

- at least one oxidation base chosen from:

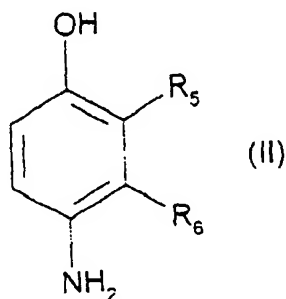
i) para-phenylenediamines of formula (I) and the acid addition salts thereof:



wherein:

- R_1 and R_2 , which may be identical or different, are chosen from a hydrogen atom, a C_1 - C_4 alkyl radical, and a C_1 - C_4 monohydroxyalkyl radical;

- R_3 is a hydrogen or halogen atom or a C_1 - C_4 alkyl or C_1 - C_4 monohydroxyalkyl radical;
- R_4 is a hydrogen atom or a C_1 - C_4 alkyl radical;
- ii) double bases;
- iii) para-aminophenols of formula (II) and the acid addition salts thereof:



wherein:

- R_5 and R_6 , which may be identical or different, are chosen from a hydrogen atom, a halogen atom, a C_1 - C_4 alkyl radical, a C_1 - C_4 monohydroxyalkyl radical, a (C_1-C_4) alkoxy (C_1-C_4) alkyl radical, a C_1 - C_4 aminoalkyl radical and a monohydroxy (C_1-C_4) alkylamino (C_1-C_4) alkyl radical, with the proviso that at least one of R_5 and R_6 is a hydrogen atom; and

- iv) heterocyclic bases;
- at least one enzyme of 2-electron oxidoreductase type;
- at least one donor for said at least one enzyme of 2-electron oxidoreductase type; and
- at least one enzymatic mediator capable of increasing the enzymatic activity of said at least one enzyme of 2-electron oxidoreductase type.

2. A composition according to Claim 1, wherein said keratin fibers are human keratin fibers.

3. A composition according to Claim 2, wherein said human keratin fibers are hair.

4. A composition according to Claim 1, wherein said at least one enzyme of 2-electron oxidoreductase type is chosen from pyranose oxidases, glucose oxidases, glycerol oxidases, lactate oxidases, pyruvate oxidases, uricases, choline oxidases, sarcosine oxidases and bilirubin oxidases.

5. A composition according to Claim 4, wherein said at least one enzyme of 2-electron oxidoreductase type is chosen from uricases of animal, microbiological and biotechnological origin.

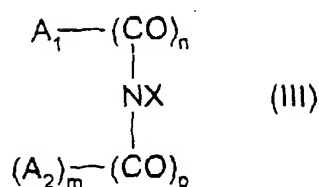
6. A composition according to Claim 1, wherein said at least one enzyme of 2-electron oxidoreductase type is present in an amount ranging from 0.01 to 20% by weight relative to the total weight of the composition.

7. A composition according to Claim 6, wherein said at least one enzyme of 2-electron oxidoreductase type is present in an amount ranging from from 0.1 to 5% by weight relative to the total weight of the composition.

8. A composition according to Claim 1, wherein said at least one donor is present in an amount ranging from 0.01 to 20% by weight relative to the total weight of the composition.

9. A composition according to Claim 8, wherein said at least one donor is present in an amount ranging from 0.1 to 5% by weight relative to the total weight of the composition.

10. A composition according to Claim 1, wherein said at least one enzymatic mediator is chosen from the compounds of formula (III) below, and the tautomeric forms thereof:



wherein:

- A_1 and A_2 , which may be identical or different, are chosen from:

- a) a saturated or unsaturated, linear or branched aliphatic radical containing from 1 to 30 carbon atoms, wherein said aliphatic radical is optionally substituted with one or more hydroxyl, halo, sulpho, carboxyl, nitro or phenyl radicals;
- b) a heterocyclic radical containing from 1 to 4 hetero atoms and from 5 to 10 ring members, wherein said heterocyclic radical is optionally substituted with one or more C₁-C₄ alkyl, halo, phenyl, hydroxyl or C₇-C₁₀ aralkyl radicals; and
- c) an aromatic radical comprising from 6 to 10 ring members, wherein said aromatic radical is optionally substituted with one or more C₁-C₄ alkyl, halo, sulpho, carboxyl, nitro, hydroxyl or nitroso radicals;

or wherein the groups A₁-(CO)_n and A₂-(CO)_p may form, together with the nitrogen atom of the group NX, a heterocycle comprising from 5 to 18 ring members, wherein said heterocycle is optionally substituted with one or more C₁-C₄ alkyl, hydroxyl, phenyl, halo, sulpho, carboxyl or nitro radicals;

- X represents a group -OH, =O, =S, →O or →S; and
- m, n and p, which may be identical or different, are integers equal to 0 or 1.

11. A composition according to Claim 10, wherein said compounds of formula (III) are chosen from hydroxylamine, N,N-dipropylhydroxylamine, N,N-diisopropylhydroxyl-

amine, phenylhydroxylamine, N-acetylhydroxylamine, 1-phenyl-1H-1,2,3-triazole 1-oxide, 2,4,5-triphenyl-2H-1,2,3-triazole 1-oxide, 1-hydroxybenzotriazole, 1-hydroxybenzotriazolesulphonic acid, 1-hydroxybenzimidazole, N-hydroxyphthalimide, N-hydroxy-succinimide, quinoline N-oxide, isoquinoline N-oxide, 1-hydroxypiperidine, violuric acid, 4-hydroxy-3-nitrosocoumarin, 1,3-dimethyl-5-nitrosobarbituric acid, 1-nitroso-2-naphthol, 2-nitroso-1-naphthol-4-sulphonic acid, 2-nitroso-1-naphthol, 1-nitroso-2-naphthol-3,6-disulphonic acid and 2,4-dinitroso-1,3-dihydroxy-benzene.

12. A composition according to Claim 1, wherein said at least one enzymatic mediator is chosen from syringic acid and its esters, acetosyringone, syringaldehyde, parahydroxycinnamic acid, vanillin, 7-hydroxycoumarin, 2,4-dichlorophenol, parahydroxybenzenesulphonate, 2,2'-azinobis(3-ethylbenzothiazoline-6-sulphonate), phenothiazines, benzidines, amino derivatives of 2-naphthalenesulphonic acid, L-tyrosine, ferulic acid, caffeic acid, chlorogenic acid and sinapic acid.

13. A composition according to Claim 12, wherein said at least one enzymatic mediator is 10-methylphenothiazine.

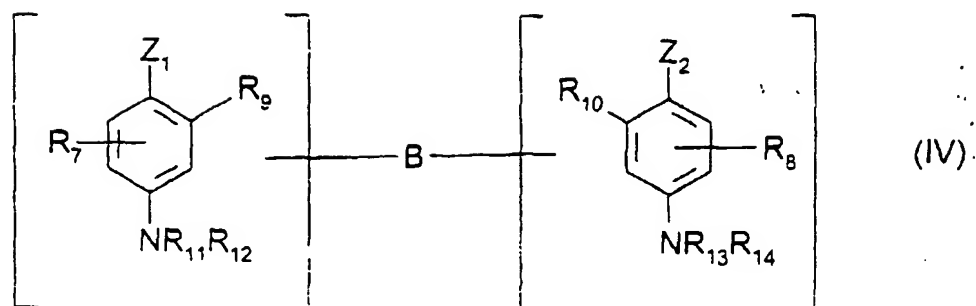
14. A composition according to Claim 12, wherein said at least one enzymatic mediator is 3,3'-dimethylbenzidine.

15. A composition according to Claim 1, wherein said at least one enzymatic mediator is present in an amount ranging from 0.0001 to 5% by weight approximately relative to the total weight of the composition.

16. A composition according to Claim 15, wherein said at least one enzymatic mediator is present in an amount ranging from 0.005 to 0.5% by weight approximately relative to the total weight of the composition.

17. A composition according to Claim 1, wherein said para-phenylenediamines of formula (I) are chosen from para-phenylenediamine, para-tolylenediamine, 2-chloro-para-phenylenediamine, 2,3-dimethyl-para-phenylenediamine, 2,6-dimethyl-para-phenylenediamine, 2,6-diethyl-para-phenylenediamine, 2,5-dimethyl-para-phenylenediamine, N,N-dimethyl-para-phenylenediamine, N,N-diethyl-para-phenylenediamine, N,N-dipropyl-para-phenylenediamine, 4-amino-N,N-diethyl-3-methylaniline, N,N-bis(β -hydroxyethyl)-para-phenylenediamine, 4-N,N-bis(β -hydroxyethyl)-amino-2-methylaniline, 4-N,N-bis(β -hydroxyethyl)amino-2-chloroaniline, 2- β -hydroxyethyl-para-phenylenediamine, 2-fluoro-para-phenylenediamine, 2-isopropyl-para-phenylenediamine, N-(β -hydroxypropyl)-para-phenylenediamine, 2-hydroxymethyl-para-phenylenediamine, N,N-dimethyl-3-methyl-para-phenylenediamine, N-ethyl-N-(β -hydroxyethyl)-para-phenylenediamine, and the acid addition salts thereof.

18. A composition according to Claim 1, wherein said double bases are chosen from the compounds of formula (IV) below, and the acid addition salts thereof:



wherein:

- Z_1 and Z_2 , which may be identical or different, are chosen from a hydroxyl radical and a $-NH_2$ radical optionally substituted with a C_1 - C_4 alkyl radical or with a linker arm B;
- the linker arm B is a linear or branched alkylene chain comprising from 1 to 14 carbon atoms, which can be interrupted and/or can end with one or more nitrogenous groups and/or with one or more hetero atoms, and which may be optionally substituted with one or more hydroxyl or C_1 - C_6 alkoxy radicals;
- R_7 and R_8 are chosen from a hydrogen atom, a halogen atom, a C_1 - C_4 alkyl radical, a C_1 - C_4 monohydroxyalkyl radical, a C_2 - C_4 polyhydroxyalkyl radical, a C_1 - C_4 aminoalkyl radical and a linker arm B; and
- R_9 , R_{10} , R_{11} , R_{12} , R_{13} and R_{14} , which may be identical or different, are chosen from a hydrogen atom, a linker arm B and a C_1 - C_4 alkyl radical;

with the overall proviso that said compounds of formula (IV) comprise only one linker arm B per molecule.

19. A composition according to Claim 18, wherein said hetero atoms are chosen from oxygen, sulphur and nitrogen atoms.

20. A composition according to Claim 18, wherein said compounds of formula (IV) are chosen from N,N'-bis(β -hydroxyethyl)-N,N'-bis(4'-aminophenyl)-1,3-diaminopropanol, N,N'-bis(β -hydroxyethyl)-N,N'-bis(4'-aminophenyl)ethylenediamine, N,N'-bis(4-aminophenyl)tetramethylenediamine, N,N'-bis(β -hydroxyethyl)-N,N'-bis(4-amino-phenyl)tetramethylenediamine, N,N'-bis(4-methylaminophenyl)tetramethylenediamine, N,N'-bis(ethyl)-N,N'-bis(4'-amino-3'-methylphenyl)ethylenediamine, 1,8-bis(2,5-diaminophenoxy)-3,5-dioxaoctane, and the acid addition salts thereof.

21. A composition according to Claim 1, wherein said para-aminophenols of formula (II) are chosen from para-aminophenol, 4-amino-3-methylphenol, 4-amino-3-fluorophenol, 4-amino-3-hydroxymethylphenol, 4-amino-2-methylphenol, 4-amino-2-hydroxymethylphenol, 4-amino-2-methoxymethylphenol, 4-amino-2-aminomethylphenol, 4-amino-2-(β -hydroxyethylaminomethyl)phenol, 4-amino-2-fluorophenol, and the acid addition salts thereof.

22. A composition according to Claim 1, wherein said heterocyclic bases are chosen from pyridine derivatives, pyrimidine derivatives, pyrazole derivatives, and the acid addition salts thereof.

23. A composition according to Claim 1, wherein said at least one oxidation base is present in an amount ranging from 0.0005 to 12% by weight relative to the total weight of the composition.

24. A composition according to Claim 23, wherein said at least one oxidation base is present in an amount ranging from 0.005 to 6% by weight relative to the total weight of the composition.

25. A composition according to Claim 1, wherein said composition is a ready-to-use composition for the oxidation dyeing of keratin fibers.

26. A composition according to Claim 1, wherein said composition further comprises at least one coupler and/or at least one direct dye.

27. A composition according to Claim 26, wherein said at least one coupler is chosen from meta-aminophenols, meta-phenylene-diamines, meta-diphenols, heterocyclic couplers, and the acid addition salts thereof.

28. A composition according to Claim 27, wherein said at least one coupler is chosen from 2-methyl-5-aminophenol, 5-N-(β -hydroxyethyl)amino-2-methylphenol, 3-aminophenol, 1,3-dihydroxybenzene, 1,3-dihydroxy-2-methylbenzene, 4-chloro-1,3-dihydroxybenzene, 2,4-diamino-1-(β -hydroxyethyloxy)benzene, 2-amino-4-(β -hydroxyethylamino)-1-methoxybenzene, 1,3-diaminobenzene, 1,3-bis(2,4-diaminophenoxy)propane, sesamol, 1-amino-2-methoxy-4,5-methylenedioxybenzene, α -naphthol, 6-hydroxyindole, 4-hydroxyindole, 4-hydroxy-N-methylindole, 6-hydroxyindolene, 2,6-dihydroxy-4-methylpyridine, 1H-3-methylpyrazol-5-one, 1-phenyl-3-methylpyrazol-5-one, and the acid addition salts thereof.

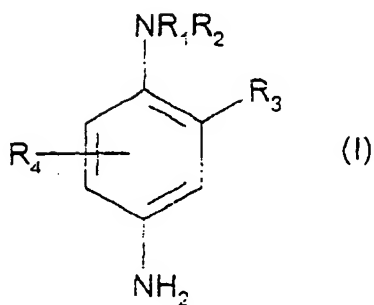
29. A composition according to Claim 1, wherein said acid addition salts are chosen from hydrochlorides, hydrobromides, sulphates, tartrates, lactates, and acetates.

30. A composition according to Claim 1, wherein said composition has a pH ranging from 4 to 9.

31. A process for the oxidation dyeing of keratin fibers, comprising applying to said fibers, at an application temperature ranging from room temperature and 80°C, and for a time period sufficient to develop the desired coloration, at least one dyeing composition comprising, in a medium suitable for dyeing:

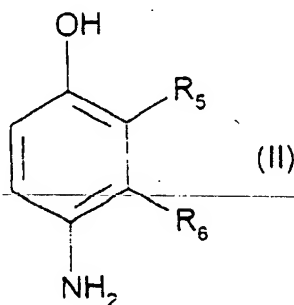
- at least one oxidation base chosen from:

i) para-phenylenediamines of formula (I) and the acid addition salts thereof:



wherein:

- R_1 and R_2 , which may be identical or different, are chosen from a hydrogen atom, a C_1 - C_4 alkyl radical, and a C_1 - C_4 monohydroxyalkyl radical;
- R_3 is a hydrogen or halogen atom or a C_1 - C_4 alkyl or C_1 - C_4 monohydroxyalkyl radical;
- R_4 is a hydrogen atom or a C_1 - C_4 alkyl radical;
- ii) double bases;
- iii) para-aminophenols of formula (II) and the acid addition salts thereof:



wherein:

- R_5 and R_6 , which may be identical or different, are chosen from a hydrogen atom, a halogen atom, a C_1 - C_4 alkyl radical, a C_1 - C_4 monohydroxyalkyl

radical, a (C₁-C₄)alkoxy(C₁-C₄)alkyl radical, a C₁-C₄ aminoalkyl radical and a monohydroxy (C₁-C₄)alkylamino(C₁-C₄)alkyl radical, with the proviso that at least one of R₅ and R₆ is a hydrogen atom; and

- iv) heterocyclic bases;
- at least one enzyme of 2-electron oxidoreductase type;
- at least one donor for said at least one enzyme of 2-electron oxidoreductase type; and
- at least one enzymatic mediator capable of increasing the enzymatic activity of said at least one enzyme of 2-electron oxidoreductase type.

32. A process according to Claim 31, wherein said keratin fibers are human keratin fibers.

33. A process according to Claim 32, wherein said human keratin fibers are hair.

34. A process according to Claim 31, wherein said application temperature ranges from 35°C to 50°C.

35. A process according to Claim 31, wherein said time period sufficient to develop the desired coloration ranges from 1 to 60 minutes.

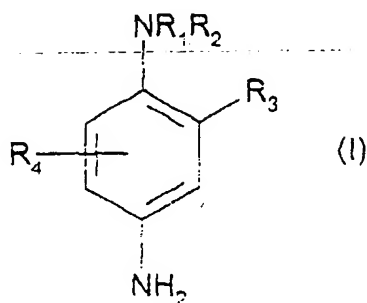
36. A process according to Claim 35, wherein said time period ranges from 5 to 30 minutes.

37. A process according to Claim 31, wherein said process further comprises the steps of:

- separately storing a first composition comprising, in a medium appropriate for dyeing, said at least one oxidation base, and a second composition comprising, in a medium appropriate for dyeing, said at least one enzyme of 2-electron oxidoreductase type, said at least one donor, and said at least one enzymatic mediator;
- mixing said first composition and said second composition at the time of use; and
- applying the mixture to said keratin fibers.

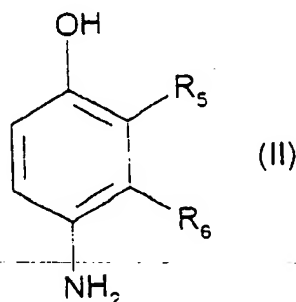
38. A multi-compartment dyeing device, comprising:

- at least one first compartment which contains at least one composition comprising, in a medium appropriate for dyeing, at least one oxidation base chosen from:
 - i) para-phenylenediamines of formula (I) and the acid addition salts thereof:



wherein:

- R_1 and R_2 , which may be identical or different, are chosen from a hydrogen atom, a C_1 - C_4 alkyl radical, and a C_1 - C_4 monohydroxyalkyl radical;
- R_3 is a hydrogen or halogen atom or a C_1 - C_4 alkyl or C_1 - C_4 monohydroxyalkyl radical;
- R_4 is a hydrogen atom or a C_1 - C_4 alkyl radical;
- ii) double bases;
- iii) para-aminophenols of formula (II) and the acid addition salts thereof:



wherein:

- R_5 and R_6 , which may be identical or different, are chosen from a hydrogen atom, a halogen atom, a C_1 - C_4 alkyl radical, a C_1 - C_4 monohydroxyalkyl radical, a $(C_1$ - $C_4)$ alkoxy $(C_1$ - $C_4)$ alkyl radical, a C_1 - C_4 aminoalkyl radical and a

monohydroxy (C₁-C₄)alkylamino(C₁-C₄)alkyl radical, with the proviso that at

least one of R₅ and R₆ is a hydrogen atom; and

iv) heterocyclic bases; and

- at least one second compartment which contains at least one composition

comprising, in a medium appropriate for dyeing:

- at least one enzyme of 2-electron oxidoreductase type;
 - at least one donor for said at least one enzyme of 2-electron oxidoreductase type; and
 - at least one enzymatic mediator capable of increasing the enzymatic activity of said at least one enzyme of 2-electron oxidoreductase type.
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